LODESTAR ENERGY

Supplemental Noise Analysis

Introduction

The distance from the southern equipment pad to the property line at 2 Cornfield Lane is 195ft. The distance from the pad to the residence at 2 Cornfield Lane is approximately 248ft. The noise level from operation of the facility at the 2 Cornfield property line is approximately 47 dBA at the maximum during the daytime, as calculated below.

Figure 1. Equipment Pad Location
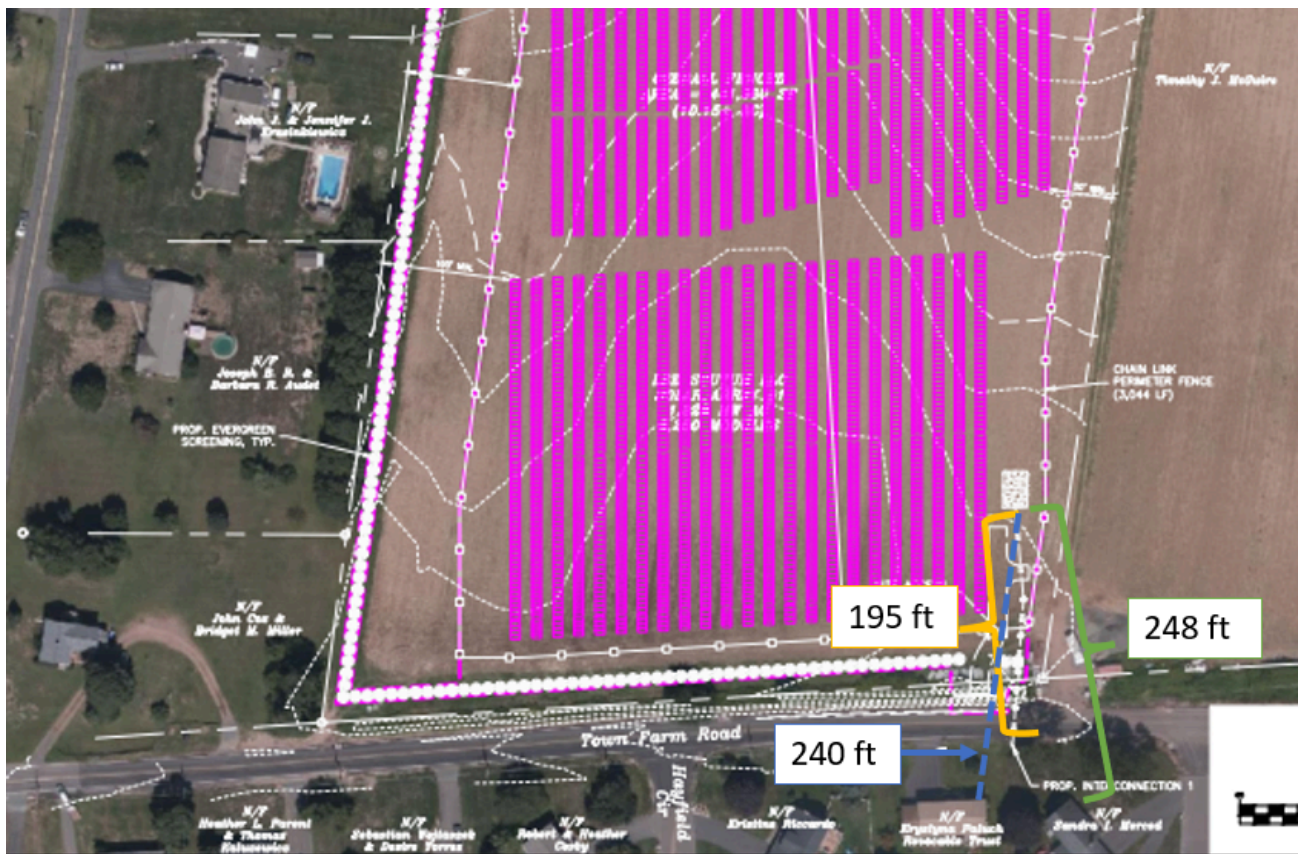
Methods/Analysis Sound Intensity of All Equipment at a Common Point

To quantify the noise output of all inverters, a logarithmic formula is required to accurately determine amplification of sound. This formula and the processes related to calculating a result are illustrated below. A separate noise analysis is conducted for each equipment pad.

Southern Equipment Pad:

Equation 1. Decibel Addition

$$L = 10\,Log_{10}\left(\sum_{i=1}^{n} 10^{(L_i/10)}\right)$$

(1) Solectria XGI 1500-166/166kW inverter = 73 dBA at 3.28 ft
(8) Solectria XGI 1500-166/166kW inverters = **82 dBA at 3.28 ft**
(1) Maddox 1500kVa transformer = 60 dBA at 3.28 ft
(8) Solectria XGI 1500-166/166kW inverters + (1) Maddox 1500kVa transformers = **82 dBA at 3.28 ft**

<p align="center">Equation 2. Audibility</p>

The proposed Project design includes the installation of inverters. The 8 inverters and 1 transformer combined have an 82.1 dBA output. To quantify the reduction in sound from the point of origin to the abutting property line at 2 Cornfield Lane (195 ft away), the formula stated in Equation 2 utilizes the inverse square law for sound intensity. This formula states that the reduction in sound pressure is relative to the distance from the source. The formula is set forth below in equation 2 and applied to the instant case in which proposed site conditions are calculated:

$$\textit{Equation 2. } DL = L_{P2} - L_{P1}$$

<p align="center">Calculation</p>

$$DL = 10\log\,log\,(R_2/R_1)^2$$

$$DL = 20log(R_2/R_1)$$

$$DL = 20\,log(195/3.28)$$

<p align="center">DL= 35 dBA</p>

<p align="center">82 dBA – 35 dBA = 47 dBA</p>

Variables:
DL = difference in sound pressure (dBA)
L_{P1} = Sound pressure level at location 1 (1m)
L_{P2} = Sound pressure level at location 2 (Property line at 2 Cornfield Lane)
R_1 = distance from source to location 1
R_2 = distance from source to location 2